

Financial Mathematics Reading Group 2016

Seminars are listed in reverse chronological order, most recent first.

Tuesday 6 December - Jose Pasos (LSE) and Thomas Bernhardt (LSE)

Tuesday 15 November - Michael Kusnetsov (LSE) and Junwei Xu (LSE)

Tuesday 8 November - Yang Guo (LSE)

Tuesday 1 November - Denis Schelling (LSE)

Tuesday 29 October - Michael Kusnetsov (LSE)

Tuesday 18 October - Weiguan Wang (LSE)

Thursday 24 March

Denis Schelling (LSE) - Mean-variance hedging

Michael Kusnetsov (LSE) - Clearing solutions in interbank networks with two maturities

Tuesday 15 March - Abdulla Al-Othman (LSE)

Equilibria in financial markets

Abstract unavailable

Tuesday 8 March - Junwei Xu (LSE)

Optimal liquidation in an Almgren-Chriss type model with Lévy processes and finite time horizons

We consider an Almgren-Chriss type liquidation model and aim to maximise the expected exponential utility of the cash position at a given finite time. The unaffected asset price follows a Levy process which may provide a good statistical fit to observed asset price data for short time horizons. The temporary price impact is described by a general function, satisfying some reasonable conditions. We reduce the problem to a deterministic optimisation problem and we derive the optimal liquidation strategy and the corresponding value function in closed forms. It turns out that, if the unaffected asset price has a positive drift, then it might be optimal to wait for a while during selling, or it might be optimal to buy back at the beginning of trading, and price manipulation is allowed in the case of positive drift. We solve the deterministic optimisation problem using calculus of variations. To this end, the Beltrami identity approach doesn't apply in a classical sense because the integrand in the objective functional is not sufficiently smooth. Nonetheless, we

establish necessary and sufficient conditions for the optimiser in a fairly general setting. In particular, we characterise the optimiser using the Beltrami identity, which is a first order ordinary differential equation. This characterisation allows us to get a closed-form solution.

Tuesday 1 March - Thomas Bernhardt (LSE)
Ito-Semi-Diffusions, a Tool to approximate Levy Processes

We are interested in processes which are distributed like Levy processes at certain time points and can be described as homogeneous diffusions between these points. We are going to analyse when such processes converge in distribution if the mesh size of the time points is going to zero. Furthermore, we are considering the existence of martingale measures for a fixed time-grid (linking the pricing problem for Levy processes approximately to the one for the above processes).

Tuesday 16 February - Jose Pasos (LSE)
Irreversible capacity expansion with possible default

We consider the problem of determining the optimal capacity expansion strategy that a firm operating within a random economic environment should adopt. We model market uncertainty by means of a general one-dimensional positive diffusion with possible absorption at 0. The objective is to maximise a performance criterion that involves a general running payoff function and associates a cost with each capacity increase up to the first hitting time of 0, at which time the firm defaults. The resulting optimisation problem takes the form of a degenerate two-dimensional singular stochastic control problem that we explicitly solve. We further illustrate our general results in the special cases where market uncertainty is modelled by a Brownian motion with drift, a geometric Brownian motion or a square-root process such as the one in the CIR model.